

ECCENTRIC OFFICIAL STATISTICS. V.

IN the March number of the *Bulletin of the Department of Labor* are data of wholesale prices from January, 1890, to July, 1899, quarterly; with a summary by Roland P. Falkner, under whose supervision the data were collected.

The analysis of the Aldrich report, not the least eccentric of our official statistics, which was the work of the statistician of the present report, has been severely criticised as leading to erroneous conclusions through giving undue weight to relatively unimportant factors. While these criticisms have been mostly of the summary of the wage statistics of that report, similar criticism is applicable to the price statistics of both the Aldrich and the present report.

By a fallacious method of giving equal weight to series of wage statistics representing the wages of a single foreman or overseer, with series representing the wages of large numbers of operatives, the report arrives at conclusions indicating an advance in average wages (gold value) from 1873 to 1891 of 7 per cent., whereas a simple arithmetical average, giving equal weight to the wages of all employés, shows a fall in wages for the period of nearly 20 per cent.¹ In one brewing establishment, which, though an extreme case, may serve for illustration, the wages of the brewer increased from \$3.19 per day in 1855 to \$23.96 per day in 1891, or 650 per cent. This brewer being put in a class by himself, the increase of his wages is given equal weight with the increase of each of four other classes which in 1891 embraced seventy employés. In consequence of this deceptive method of computation there is an apparent increase in wages for the establishment of 165.9 per cent., whereas if we omit from the calculation the class comprising but the one brewer, the average for the remaining classes shows an increase for the period of but 90 per cent. Thus the increase in the wages of but one man is made to nearly double the apparent increase of the wages of the entire brewing industry, for which this establishment stands as the sole representative in the Aldrich report. Professor Charles J. Bullock, in the quarterly publication of the American Statistical Association (March, 1899), criticising this report, remarks:

¹See computations of PROFESSOR CHARLES B. SPAHR in *Present Concentration of Wealth in the United States*.

This typical brewer, who received over \$6,000 per year, and was certainly worth that amount as a subject for statistical investigation, counted for as much in determining the simple average as 133 laborers included in a single series in establishment 48. The brewer's wages increased 275 per cent. between 1860 and 1891. The wages of the 133 laborers increased 29.5 per cent. The report has adopted a method of averaging that gives equal weight to each of these series, and figures out a simple average increase of 152.25 per cent. for the 134 workmen. In computing the weighted average for all industries the report makes a bad matter worse. The industry in which the brewer was employed is given a weight of 16, while that in which the 133 laborers were engaged receives a weight of 5. Such a method of weighing made the brewer simply invaluable for statistical purposes.

It may be noted also that in July, 1883, there appears on the payroll of this establishment a second brewer, at much lower wages than were paid to the first brewer, but that, instead of following the method adopted with other classes, viz., taking the average wages of these two employés as representing brewers' wages, the report classifies the second brewer separately as an "assistant brewer." The assistant brewer's wages not making a complete series, they are omitted entirely from the computation. By this method the statistical value of the wages of the brewer was preserved.

Professor Mayo-Smith, in his recent work, *Statistics and Economics*, in discussing the use of index numbers of prices, shows the effect of giving undue weight to unimportant articles, saying :

Professor Falkner, for instance, has twenty-five quotations of pocket-knives out of a total of fifty-four for metals and implements, and a grand total of 223 articles. On the other hand he has but fifteen quotations for house-furnishing goods, of which seven are for wooden pails and tubs. He has but two quotations for vegetables (both potatoes) and four for fish (of which three are for salted mackerel). Undue prominence seems to be given to articles of no very great importance.

To show the effect upon the average of the food group of including the latter unimportant articles, this writer further remarks :

Among the articles which go to form the important index number for food are four kinds of fish. All of these show a rising price since 1860; and the single quotation of codfish gives an index number of 312 for 1891, on the basis of 100 for 1860. The whole index number for food shows a rise from 100 in 1860 to 103.9 in 1891. This is a very interesting fact, because food is a most important article of consumption, and this rise is in marked contrast with the fall of the great mass of commodities. If, however, we exclude the single item codfish, the number for 1891 becomes 99.9, and if we exclude all four quotations of fish which cover simply codfish and mackerel, the number

becomes 94.9. That is, the rise of $3\frac{1}{2}$ per cent. is turned into the very considerable fall of 5 per cent. In other words, by giving four quotations out of fifty-three to codfish and mackerel, a change of eight points is made for the index number for food.

Referring to the group "Drugs and Chemicals" we find a still more striking illustration of the effect of an abnormal change in price of a single article. This group, which embraces eighteen articles, is represented for 1891 by the index number 86.3, showing a fall in prices for the group since 1860 of not quite 14 per cent. If we omit the single item alcohol, the index number for 1891 becomes 67.2, showing a fall of prices for this group of nearly 33 per cent., a difference of nineteen points. The price of alcohol, which includes a tax of several hundred per cent., is no more indicative of the course of prices than the rise of 650 per cent. in the pay of a brewer is indicative of the course of wages. The increase in the one case represents, not an increase in prices, but of taxation, and in the other, not increased pay for the same work, but increased pay for a position of increased responsibility, requiring greater skill and efficiency. Deducting from the price of alcohol, as quoted in 1891, the heavy revenue tax of \$2 per gallon, and comparing with the price of 1860, we find, instead of a rise of 311 per cent., a fall of over 50 per cent.

The eccentric methods of the statistician of the Aldrich and present reports we find further illustrated in the food group of the former report, where, besides the four quotations of fish referred to by Professor Mayo-Smith, we find included as bread eight quotations of different kinds of crackers, with but one quotation of wheat flour. Wheat is entirely omitted from the summary, though ample data of that article are presented in Part II of the Aldrich report. We find also five quotations of salt. Thus salt is given five times and crackers eight times the weight of wheat flour. Though wheat flour fell 27.9 per cent. from 1860 to 1891, the average of the eight quotations of crackers shows a rise of 2.1 per cent. From 1873 to 1891 the price of wheat flour (gold value) fell 40 per cent., while that of crackers fell but 8.4 per cent. At the same time there was a fall of 19.8 per cent. in the price of meat. Yet the food group shows a fall for the period of but 9.8 per cent.

Though it has been thought that because of the inclusion of a larger number of articles the index numbers of the Aldrich report are more to be relied upon than others which show a greater fall of prices, the contrary seems true, because of the undue weight given to articles of little importance. Though in his weighted average Professor Falkner

claims to have guarded against error that might result from this cause, he seems but to have made a bad matter worse, as is undoubtedly the case in his weighted wage statistics. For instance, in weighing the wages of employ  s in the building trades, he assumes that all persons returned in the census tables of occupation as carpenters, masons, painters, etc., have obtained the increase of wages shown in establishments reported in the Aldrich report as "Building Trades Establishments," for which a high ratio of increase is shown. Yet, for instance, of the twenty-two series of carpenters' wages of which use is made in the Aldrich report, only seven are from establishments entitled "building trades," and of thirteen series of painters' wages only five are from "building trades" establishments.

As is shown by the pay-rolls of these other establishments, in which the larger number were employed, the increase in wages was much less than in these building trades establishments, evidently located in large cities where wages had increased with the increased cost of living. Yet by this system of weighing the statistician estimates that all carpenters, masons, painters, etc., have enjoyed the increase in wages of these establishments shown by the data of the report itself to be non-representative.

As but a small proportion of bread or flour is consumed as crackers, it seems also erroneous to take the relative prices of crackers as to any considerable extent representing the ratio of prices at which flour or wheat was consumed. Neither does it seem correct to assume that all fish was consumed at the relative prices of mackerel and codfish shown in the quotations of those articles. The majority of consumers certainly do not pay Fifth avenue prices for fish. Yet the prices quoted for codfish, which we have found so largely to affect the price average of the food group, are stated to have been furnished by Hitchcock, Darling & Co., Fifth Avenue Hotel, New York. While codfish is thus quoted at 4 cents per pound in 1860, and 12½ cents in 1891, we find on the next page of the report (Part II, p. 80) a quotation of codfish which indicates that the quotation used does not fairly represent the increase in the price of that article. The latter quotation is for pickled codfish, showing it to have been worth \$4 per 112 pounds in 1875, and \$4 per 112 pounds in 1891. This quotation is stated to have been furnished by the secretary of the Boston fish bureau. As the quotation did not make a complete series from 1860, it was not used by the statistician in his computation. It, however, goes to show that there was not the estimated increase in the

price of all fish. While it is not possible in most cases to verify the data of either the Aldrich or the present report, there seems to be ground, in many instances, for doubting their accuracy. It seems absurd to suppose, for instance, that, with improved methods of production and generally falling prices, pine kitchen tables cost 25 per cent. more in 1891 than in 1860. In his paper previously quoted, Professor Bullock calls attention to the fact that in the wage data seven industries out of the seventeen investigated were represented by a single establishment, and that the increase of wages shown for these industries was considerably greater than for the other industries, and remarks :

This fact is of significance in two ways. Since the results for these industries, represented by insufficient data, diverge so considerably from the results indicated in other industries, where the enumeration was more comprehensive, we have a positive reason for suspecting that the establishments selected were not typical of the industries to which they belong. In the second place it is probable that the inclusion of figures based upon insufficient data resulted in an exaggeration of the rate of increase of wages between 1860 and 1891, when the report computed a simple average for all industries. The matter was made still worse when the weighted average was calculated. These seven industries were then given weights that aggregated 684 out of a total weighing of 1,945 that was applied to all industries.

One of these industries represented by a single establishment was the manufacture of carriages and wagons, in which there is shown an increase of wages of over 100 per cent.; the index numbers being 100 in 1840, 1850, and 1860, and 202.4 in 1891. Fortunately we have in Colonel Wright's report on the use of machinery official data which more nearly agree with the observation of persons employed in this industry. It is shown in this report (Vol. I, p. 36) that the labor cost of manufacturing one farm wagon of similar construction was \$35.35 by the hand method in 1848, and \$7.18 by the machine method in 1895. The time occupied in the first instance was 242 hours, and in the latter 48 hours, 17 minutes, 8 seconds. Thus, though the labor was five times as efficient, there was but a fraction of a cent difference in the average wages. For painting the wagon, in which no machinery is used, the time consumed in 1848 was 20 hours, and the labor cost \$3; while in 1895 the time consumed was 10 hours and 48 minutes, and the labor cost \$1.59. Thus for nearly double the amount of work the average wages received by painters in this establishment were 2½ cents an hour less in 1895 than in 1848. While this is not, perhaps, a fairly typical establishment, the figures are official, and show

that by a judicious selection of establishments it is possible to "conclusively" demonstrate either an increase or decrease in the average rates of wages. The same being true, to a considerable extent at least, regarding prices, there seems not a little truth in what has come to be a common saying: "You can prove anything with figures." While the methods of the Aldrich report, as we have seen, tended to minimize or conceal the fall in prices, those of the present report appear to have an opposite tendency.

That Professor Falkner is aware of errors of the former report is apparent from certain changes of method, as well as from remarks of the present report. For instance: While in the summary of the Aldrich report there were used 223 series of actual and relative-prices, the present report presents but 142 series of actual prices, and ninety nine series of relative prices. The small number of relative-price series is owing to a change of method whereby, there being several quotations of one article, the average is taken, and one relative-price series obtained. In the former report, as we have seen, there were eight quotations of crackers, all of which constituted a price series; in the present report, with four quotations of crackers, the average is taken, and but one series obtained. With numerous omissions of articles from the present report that were used in the Aldrich report, we find a considerable number included that were not used in the first report. It is noticeable that every article included in the present report, not in the former report, without exception is one showing more or less of a fall in price, and that in many instances the articles omitted, which were in the former report, are those that have risen in price.

It is remarked in this report:

A continuation of the prices, such as would have permitted a comparison of more recent prices with those of 1860, as given in the Aldrich report, could only be had where the articles remained identical in kind and quality, and where the same sources of information were accessible. The attempt to carry out the new investigation on the same lines as the old one revealed the fact that in many cases the firms and corporations from which the original figures were derived were no longer in existence. Newer firms which had taken their places were often unable to identify the figures quoted in the Aldrich report for the years 1890 and 1891 from material in their possession. This implied that an article of the exact grade and quality which had been quoted by the former firms was not traded in by those to whom subsequent application was made. In many cases the article was no longer in the market. Changes, as for instance in the manufacture of woolens and worsted goods, had made new standards for certain classes of commodities.

The application of the foregoing remark would seem more obvious were it not for the fact that, according to the statement of the articles in the two reports found on p. 238, with few exceptions the articles omitted from the present report are those easily identified, and which have a market price. The principal change in the group "Cloths and Clothing" is the addition of a number of articles, the only omission being broadcloth and blankets.

There certainly could be no more difficulty in obtaining prices of window glass than of putty, and yet in the group "Lumber and Building Material" we find the more important article omitted and putty included. While putty had fallen, glass, for the period covered by the report, had advanced. In December, 1899, however, there was a cut of from 30 to 40 per cent. It is generally understood that this cut was made in order to freeze out or bring to terms the numerous small establishments outside the glass trust.

The other omissions from this group are oxide of zinc, largely used in the manufacture of paints, and plate glass. The prices of these articles are both controlled by a trust, that of the former being considerably higher than in 1890, and that of the latter having greatly advanced during the last two or three years.

To the food group we find added baked beans, and omitted lamb and potatoes; while coffee, which fell in price from $20\frac{1}{4}$ cents in 1890 to $6\frac{3}{4}$ cents in 1899, is retained. Such a fall is plainly abnormal, and not indicative of the course of prices. The author remarks (p. 243): "The criteria whether a price is normal are not found in the prices themselves, but in all the surrounding circumstances." The high price of coffee in 1890 was the result of a blight which attacked the principal source of supply—the coffee plantations of Brazil—and the subsequent fall the result of the later abundant production.

It seems an error to have included this price series, and also two price series of spices, nutmegs, and pepper, each of which shows a considerable fall in price. To have taken the average of the two latter articles as one series would be in accordance with the rule generally followed in this investigation. Another exception to this rule we find in steel, the articles steel billets and steel rails being each made a series. Yet, notwithstanding the weight given to these articles, which had considerably fallen in price, the group "Metals and Implements" shows a slight advance from January, 1890, to July, 1899, which is in marked contrast with the fall of 25 per cent. from 1860, and of 35 per cent. (gold value) from 1873 to 1891, shown by the Aldrich report.

As showing the slight difference made by the change in articles, the report exhibits the result of a comparison of the ninety articles common to the two reports, showing the fall from January, 1890, to January, 1899, but 1 per cent. greater than for the articles of the present investigation. This, however, takes no account of the articles of the former report not included in the present investigation, nor of those in the present not included in the former report. Nor does it show the effect of the change from a method which gave so much weight to pocket-knives, crackers, and fish.

It is remarked :

A continuous series of relative prices for a long period of time, except for a very restricted number of articles, is an ideal which is impossible of realization in practice. From time to time the lists of articles must be revised because of the changing character of our consumption.

Yet the changes made seem hardly in conformity with this idea. In the group "Fuel and Lighting" we find candles retained as a representative of expenditure for illumination, and in other groups articles added that are less representative than those omitted. From the summary by groups it appears that, according to this investigation, what is termed the level of prices had reached the lowest point July 1, 1897, since which time there has been a rise of 16 per cent. to July 1, 1899, a point 9 per cent. below the price level of January 1, 1890.

This report failing to show the great increase in prices during the latter part of 1899, and indicating a decline since January, 1890, has already been widely quoted as overturning the popular impression as to the effect of trusts on prices, and will undoubtedly be frequently so quoted in the coming campaign. It seems at least remarkable that the price quotations of a report published in March of the present year should not at least include prices for the whole of the year 1899. Prices for October, 1899, and for January of the present year are certainly those most easily obtained, and would furnish information regarding the recent great increase in prices, regarding which the public is at present most deeply interested.

From the standpoint of those whose primary desire is not the success of this or that political party or economic interest, but that each political campaign shall be a genuine campaign of education, official publications so obviously open to criticism must be regarded as peculiarly inopportune. If partisans allege, as they have not ceased to do in the case of the Aldrich report, that the document before us was prepared for campaign rather than for scientific or economic use,

it will be easy to make out a *prima facie* case in support of the charge. The character and scholarship of the men responsible for the work will hardly be of sufficient weight with the general public to quash the indictment. At other times eccentricities like those which we have pointed out might pass as harmless academic oversights. The eminence of their authors would be a guarantee of their good faith. It is too much to expect, however, that in the heat of a national campaign either party will give the benefit of any doubt to purveyors of such inaccuracies.

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